HOW TO ASSESS

HIGHER-ORDER
THINKING SKILLS
IN YOUR CLASSROOM

What Is Knowledge?

The nature of human thought and reason is the subject of a field of philosophy called epistemology. Epistemologists still debate the definition of *knowledge*. A classic definition, based on ideas in Plato's dialogue *Theaetetus*, is that for something to count as knowledge it must be *justified*, *true*, and *believed*. Branches of philosophy have developed to describe what count as reasonable and plausible justifications, what counts as truth, and the nature of belief.

I use this tidbit about Plato to make what I consider an important point. Even seemingly simple knowledge rests on some historical higher-order thinking. Facts and concepts did not just fall out of the sky—or out of a textbook. They were discovered and debated until they came to be widely held as true, and widely believed. When we teach students to do higher-order thinking, we are not just teaching them some fancy skills useful for the flexibility and adaptability required for life in our 21st century "information age." We are teaching them to be human.

What Is Higher-Order Thinking?

If we agree to stay grounded in this important purpose, our definitions of higher-order thinking for the purposes of this book can be much more modest and practical. In this Introduction, we consider the kinds of higher-order thinking that are (or should be) stated or implied in state content standards and classroom learning objectives. Definitions that I find helpful fall into three categories: (1) those that define higher-order thinking in terms of *transfer*, (2) those that define it in terms of *critical thinking*, and (3) those that define it in terms of *problem solving*.

Here is a definition in the *transfer* category:

> Two of the most important educational goals are to promote retention and to promote transfer (which, when it occurs, indicates meaningful learning) . . . retention requires that students remember what they have learned, whereas transfer requires students not only to remember but also to make sense of and be able to use what they have learned. (Anderson & Krathwohl, 2001, p. 63)

whatever-you-want kind of thinking? Actually, no. Most human creations, both inventions of things and inventions of social customs, were conceived to solve some sort of problem. The proverbial invention of the wheel, for example, solves a problem that can be expressed as "How do I get this heavy stuff from here to there?"

If you think of higher-order thinking as problem solving, the goal of teaching is equipping students to be able to identify and solve problems in their academic work and in life. This includes solving problems that are set for them (the kind of problem solving we usually think of in school) and solving new problems that they define themselves, creating something new as the solution. In this case, "being able to think" means students can solve problems and work creatively.

What Is the Effect of Assessing Thinking Skills?

When you teach and assess higher-order thinking regularly, over time you should see benefits to your students. Your understanding of how your students are thinking and processing what they are learning should improve as you use assessments specifically designed to show students' thinking. Ultimately, their thinking skills should improve, and so should their overall performance. Students learn by constructing meaning, incorporating new content into their existing mental representations; therefore, improving thinking skills should actually improve content knowledge and understanding as well. How large can we expect this effect to be?

Higgins, Hall, Baumfield, and Moseley (2005) did a meta-analysis of studies of thinking-skills interventions on student cognition, achievement, and attitudes. A meta-analysis is a quantitative synthesis of studies that reports effect sizes, or amount of change in standard-deviation units. Standardizing the effects from different studies means researchers can average effect sizes across studies, which yields a more stable estimate of the size of an effect—in this case, the effect of thinking-skills interventions—than any one study alone could provide. For their review, Higgins and his colleagues defined thinking-skills interventions as "approaches or programmes which identify for learners

The Contents of This Book

This book is intended to help teachers assess the kind of complex thinking emphasized by current content standards in various disciplines. I first lay out principles for assessment in general and for assessment of higher-order thinking in particular (Chapter 1). Then I define and describe aspects of higher-order thinking emphasized in classroom learning and give examples of how to assess each aspect (Chapters 2 through 6).

The focus of the book is on *assessment* of higher-order thinking. I describe how to design assessments that require students to do higher-order thinking in an explicit enough form that the thinking becomes visible for appraisal, feedback, and discussion with the student. I describe both how to write and how to score questions and assessment tasks. The scoring is part of the assessment: if a question requires higher-order thinking but the scoring scheme only gives points for correct recall of facts, the assessment fails as a measure of higher-order thinking.

Of course, assessment of higher-order thinking assumes *teaching* of higher-order thinking. Although teaching these skills is not the subject of this book, it is worth noting that working through tasks like those in this book, with lots of feedback, could be part of such instruction. The ultimate goal is for students to learn to do more higher-order thinking, and do it better.

For ease of illustration, I use the following categories of higher-order thinking in the chapters illustrating ways to assess various aspects of such thinking:

- Analysis, evaluation, and creation (the "top end" of Bloom's taxonomy).
- Logical reasoning.
- Judgment and critical thinking.
- Problem solving.
- Creativity and creative thinking.

Chapters 2 through 6 describe in more detail the specific category, give guidelines for how to assess it, and provide some examples. These categories are consistent with the discussions of higher-order thinking as transfer, reasoned judgment, and problem solving. They also make a useful framework for talking about assessment (and instruction, too, for that matter), because slightly

1 | General Principles for Assessing Higher-Order Thinking

Constructing an assessment always involves these basic principles:

- Specify clearly and exactly what it is you want to assess.
- Design tasks or test items that require students to demonstrate this knowledge or skill.
- Decide what you will take as evidence of the degree to which students have shown this knowledge or skill.

This general three-part process applies to all assessment, including assessment of higher-order thinking. Assessing higher-order thinking almost always involves three additional principles:

- Present something for students to think *about*, usually in the form of introductory text, visuals, scenarios, resource material, or problems of some sort.
- Use novel material—material that is new to the student, not covered in class and thus subject to recall.
- Distinguish between level of difficulty (easy versus hard) and level of thinking (lower-order thinking or recall versus higher-order thinking), and control for each separately.